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AUTHOR Scott, Michael; Wheeless, Lawrence
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ABSTRACT

This investigation sought to assess the relationship of oral, receiver, and written communication apprehension to students' attitudes and levels of satisfaction with various instructional strategies in interpersonal communication courses, to assess the relationships between these types of communication apprehension and student achievement, and to develop models concerning which instructional strategies produced more favorable attitudes, greater satisfaction, and better achievement for various categorical combinations of apprehension levels. Complete data were gathered from 194 students in a university-level communication course. Among the results were the findings that for most people, oral, written, and receiver apprehension were not additive and that seeking to determine the best instructional strategies for various categorical combinations of the three types of apprehension appeared to be of minimal importance. Rather, high levels of apprehension of any of the three types pointed to in-class discussion as a poor instructional strategy in terms of attitudes and satisfaction. Results were interpreted as indicating that treatment of the apprehension itself would be the most direct and effective instructional strategy for communication teachers. (Author/AA)

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# An Exploratory Investigation of the Relationships of Three Types of Communication Apprehension To Student Attitudes, Levels of Satisfaction, and Achievement

by

Michael Scott and Lawrence Wheeless
West Virginia University
Morgantown, West Virginia 26506

## Abstract

This investigation sought to: (1) assess the relationship of oral, receiver, and written communication apprehension to student attitudes and levels of satisfaction with various instructional strategies in interpersonal communication courses; (2) assess the relationships between these types of communication apprehension and student achievement; and (3) develop models concerning which instructional strategies investigated produced more favorable attitudes, greater satisfaction, better achievement for various categorical combinations of apprehension levels. Five directional hypotheses and two research questions were tested. Results provided only weak support for the hypothesized relations.

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An Exploratory Investigation of the
Relationships of Three Types of Communication Apprehension
To Student Attitudes, Levels of Satisfaction, and Achievement

Teachers of speech communication have long been concerned with factors that may impair an individual's ability to encode spoken messages. Generally, this concern has been most evident in the study and treatment of what is commonly referred to as oral communication apprehension[1]; that is, apprehension resulting from individual's perception that the possible gains from participating in oral communication will be out-wighed by the abnormal levels of apprehension s(he) will experience as a function of such participation.[2]

A number of recently published studies, however, suggest that communication apprehension may encompass much more than oral communication by a source. Wheeless, for example, has reported factor analytic research substantiating the notion that a dimension or type of communication apprehension exists for the receiving as well as sending function of communication.[3] Likewise, Daly and Miller also report factor analytic research suggesting that yet another dimension or type of communication apprehension exists for the encoding of written messages.[4] Since communication apprehension appears to be a function of more than oral communication behaviors, this study was designed to assess the relationship of the preceding types of communication apprehension to several facets of speech communication instruction. Specifically, this study was designed to assess the relationship of oral, receiver, and writing communication apprehension to student attitudes, levels of satisfaction, and achievement in a basic interpersonal communication course. A brief review of each of these types of apprehension demonstrates the desirability of such an assessment.

Oral Communication Apprehension

Communication apprehension is a broadly based fear or anxiety about real or anticipated oral communication with one or more people.[5] Few constructs growing out of the research on human communication phenomena have been found to significantly affect such a wide array of human behaviors as oral communication apprehension.

Of particular interest to this investigation, however, are the effects of oral communication apprehension in the classroom environment. To begin with, the most obvious effect of oral communication apprehension involves instructional activities that require the highly apprehensive student to participate; for example, public speaking or small group discussions. The research literature suggests that students who are highly apprehensive about oral communication not only perform substantially below the norm when required to participate in such activities, but would avoid such activities altogether if given the opportunity.[6]

High degrees of oral communication apprehension appear to also affect students in less obvious ways than the preceding. A number of studies, for instance, point to the fact that highly apprehensive students generally have lower grade point averages and achieve less on standardized measures of achievement (eg., ACT)[7] than students who are only moderately apprehensive about oral communication. Furthermore, students who exhibit high levels of oral communication apprehension generally achieve less in all courses--regardless of the content of the course of the instructional methodology that is employed.[8] It would appear, consequently, that oral communication apprehension influences a great deal more than simply those activities common to performance classes in speech communication.

Receiver Apprehension

Whereas oral communication apprehension seems to be related to an individual's fear of social disapproval, Wheeless argues that receiver apprehension seems to be more related to an individual's fear of misinterpreting, inadequately processing, and/or being unable to psychologically adjust to messages. Receiver apprehension, then, is conceptually rooted in decoding rather than encoding processes and, according to Wheeless, is statistically independent of apprehension associated with the encoding of oral messages. While receiver apprehension is a recent discovery, at least one study has found that it affects student achievement in the communication classroom.[9]

Writing Apprehension

Writing apprehension is concerned with an individual's ability to effectively encode written messages as well as individual predispositions toward such encoding behaviors. Like oral and receiver communication apprehension, writing apprehension is measured by means of a slef-report instrument. More importantly, the writing apprehension construct appears to have considerable predictive validity. Daly and Miller have reported that levels of writing apprehension predict among other things perceptions of past, present, and future success in an individual's writing endeavors as well as predispositions to respond favorably or unfavorably to writing tasks. More recent research also suggests that high levels of writing apprehension will have a generalized impact on standardized mesarues of achievement.[11] As is the case with oral and receiver communication apprehension, then, writing apprehension may have a dramatic impact on a student's overall progress.

## Rationale, Hypotheses, and Research Questions

Attitudes and Levels of Satisfaction

Given the preceding purpose and conceptual framework, the present study focused on the impact of "communication apprehension" in an interpersonal communication course employing a variety of instructional strategies for purposes of student learning. Specifically:

1. Mass Lectures
2. Lectures in Small Group Recitation Sections
3. Oral Simulation Exercises in Class
4. Writing Simulation Exercises in Class
5. In-Class Small Group Discussions and Problem-Solving Exercises
6. Textbook Readings
7. Activities outside of class which require students to orally interact, observe and interpret communication behavior, and write written reports of their observations and interpretations.

Since these instructional strategies make differential demands on a student's encoding and decoding abilities, it seems reasonable to assume that the student's attitude and level of satisfaction toward a particular instructional strategy would be largely a function of the level of apprehension the student associated with it. It is intuitively compelling, for example, to reason that students who are highly apprehensive about oral communication would exhibit less favorable attitudes and express less satisfaction with instructional strategies requiring oral communication than students who are not apprehensive about oral communication. The same reasoning seems applicable, moreover, to receiver and writing apprehension. That is, it seems

reasonable to assume that students who are apprehensive about decoding messages or encoding messages would hold less favorable attitudes and express less satisfaction with instructional strategies that make such decoding or encoding demands than students who are not apprehensive about such information processing demands. Empirical support for at least part of this line of thought exists. As a case in point, Scott, Yates, and Wheeless[12] found that students in an individualized system of instruction who were highly apprehensive about oral communication exhibited less favorable attitudes and expressed lower levels of satisfaction with instructional content and methods requiring oral communication than students who were not apprehensive. And, as previously mentioned, Daly and Miller reported that students who experienced high writing apprehension expressed little confidence in their writing abilities, responded unfavorably to the prospect of required writing tasks. Upon this basis, the following hypotheses were tested in the present study:

$H_1$: Students who are highly apprehensive about encoding oral communication will exhibit significantly less favorable attitudes and express significantly less satisfaction with instructional strategies requiring oral communication than students who are not apprehensive about encoding oral communication.

$H_2$: Students who are highly apprehensive about encoding written communication will exhibit significantly less favorable attitudes and will express significantly less satisfaction with instructional strategies requiring that they encode written messages than students who are not apprehensive about encoding written messages.

$H_3$: Students who are highly apprehensive about decoding communication will exhibit significantly less favorable attitudes and express significantly less satisfaction with instructional strategies requiring that they process and interpret the messages of others than students who are not apprehensive about decoding communication.

There is also good reason to believe that the three types of "communication bound" apprehension under investigation in this study are additive. As a result, the following hypotheses were also tested:

$H_4$: Oral, receiver, and written communication apprehension will be additive in affecting attitudes and levels of satisfaction toward a combination of instructional strategies.

$H_5$: Oral, receiver, and written communication apprehension will be additive in affecting levels of achievement when a combination of instructional strategies is utilized.

Finally, in order to derive predictive models concerned with type of communication apprehension, instructional strategies, student attitudes and levels of satisfaction, and student achievement, the following research questions were posited:

$Q_1$: Which instructional strategies produce more favorable attitudes and greater satisfaction for various categorical combinations of apprehension (oral, receiver, written) levels?

$Q_2$: Which instructional strategies produce greater levels of achievement for various categorical combinations of apprehension (oral, receiver, written) levels?

## Method

### Procedures and Resulting Sample

Students enrolled in mass lecture sections of a university level, communication course were administered the Personal report of Communication Apprehension (PRCA),[13] the Receiver Apprehension Test (RAT),[14] and the Writing Apprehension Test (WAT).[15] These tests were distributed on the first day of class for the spring semester, 1975, and were collected in small laboratory sections. Students enrolled in laboratory sections concerned specifically with dyadic, interpersonal communication were subsequently (at midterm) administered tests measuring attitudes toward various instructional strategies and satisfaction with the various instructional strategies. At the completion of the semester, achievement scores were obtained for examinations and application projects. The three data sets (apprehension, attitudes/satisfaction, achievement) were merged to produce 194 complete data observations (265 Ss had at least partial data reported). The 26% attrition was due largely to student absences during one of the 3 times data was collected and failure to match data sets due to errors in student identification numbers reported on IBM answer sheets on the first instance of data collection regarding apprehension.

### Measurement

PRCA, measuring oral communication apprehension, was a 25-item Likert-type instrument displaying the following descriptive characteristics: split-half reliability = .92, mean = 72.30, standard deviation = 15.49. RAT, measuring apprehension associated with receiving communication, was a 20-item Likert-type instrument displaying the following descriptive characteristics: split-half reliability = .87, mean = 42.20, standard deviation = 8.13. WAT, measuring apprehension associated with writing, was a 20-item Likert-type instrument displaying the following descriptive characteristics: split-half reliability = .94, mean = 55.09, standard deviation = 13.42.

Subjects' attitudes toward the various instructional strategies were assessed using a series of four, seven-interval, evaluative semantic differential scales.[16] The bi-polar adjectives in all instances were: good/bad, worthless/valuable, fair/unfair, and positive/negative. (Polarities were systematically varied in order to minimize response bias.) These 4 scales were summed for each instructional strategy assessed with extreme positive ratings receiving a score of 28 and extreme negative ratings receiving a score of 4. The resulting reliabilities[17] for each assessment of instructional strategies and the relevant instructional strategies were as follows:

1. "Mass lectures in Speech Communication 11" = .92;
2. "Lectures in your Speech 12 class (lab)" = .88;
3. "In-Class exercises which require you to communicate Orally" = .91;
4. "In-class exercises which require you to write responses, messages, etc." = .93;
5. "Reading the textbook" = .92;
6. "In-class discussions in which you are asked to participate" = .90;
7. "In-class simulations, games, and exercises" = .92;
8. "Graded activities outside of class which require you to observe and interpret the communication behavior of others" = .93;

9. "Graded activities outside of class which require you to write about your observations and interpretations of the communication behaviors of others" = .93.

Subjects' level of satisfaction toward instructional strategies requiring oral, written, reception-of communication were assessed in a similar fashion. However, the bi-polar adjectives in these instances were: satisfying/unsatisfying, gratifying/not gratifying, fulfilling/unfulfilling, and sufficient/insufficient. Again, sums of these 4 items for each assessment resulted in a range of 4-28. The resulting reliabilities for each assessment of satisfaction with instructional strategies were as follow:

1. "How satisfied are you with instructional methods that require you to communicate orally; for example, oral reports" = .96;
2. "How satisfied are you with instructional methods that require you to observe, listen, and interpret the communication behavior of others" = .95;
3. "How satisfied are you with instructional methods that require you to write" = .95.

Achievement was measured with examination average and average score on projects/exercises. Three criterion-referenced examinations were given on specified cognitive objectives for the course. The multiple choice (5-option) examinations consisted of two, 50-item and one 25-item exams. The first exam (50-item) displayed the following descriptive statistics: reliability (KR-20) = .86, mean = 39.47, standard deviation = 6.83, standard error of measurement = 2.74. The second exam (50-item) displayed the following characteristics: reliability (KR-20) = .82, mean = 25.18, standard deviation = 6.61, standard error = 3.12. The third exam (25-item) displayed the following descriptive statistics: reliability (KR-20) = .70, mean = 20.15, standard deviation = 3.21, standard error = 1.91. All exam items were developed with discriminant item analyses the previous semester. The exam average was derived by weighting the 50-item tests twice as heavily as the 25-item test which was converted (via linear transformation) to a compatible fifty unit scale. The resulting examination average had the following characteristics: mean = 38.42, standard deviation = 5.78, range = 7.20-48.80. Projects were graded on the following criteria: not attempted = 0, attempted = 1, completed as assigned = 2, and completed as assigned plus extra, relevant project report on the topic = 3. For ease of analysis and interpretation, project averages (0-3 point scale) were multiplied by the constant of 16.6667 (linear transformation) in order to transform them to the same metric as the examination average. The resulting project average had the following characteristics: mean = 41.91, standard deviation = 6.90, range = 14.34-50.00.

Design and Statistical Analysis

Multivariate Analysis of variance was used to test all hypotheses at the .05 level of statistical significance. For the first three hypotheses, high and low levels of PRCA, RAT, and WAT served as the classification/independent variables in three, one-way analyses and attitude/satisfaction means were treated as the criterion/dependent variables. High and low apprehensives (PRCA, RAT, or WAT) were operationalized as beyond a standard deviation above and below the mean respectively. For the fourth and fifth hypotheses two, three-way multivariate analysis of varaince were attempted (High vs. Low PRCA X High vs. Low RAT X High vs. Low WAT). For the first MANOVA attitude and satisfaction means constituted the criterion/dependent variables; for the second, achievement means were the dependent variables (exam and project averages). Pearson product-moment correlations among all criterion/dependent variables were ascertained to check the validity of assumptions underlying

MANOVA regarding dependent variables. Roy's maximum root criterion, which has an F-distribution, was used to determine the critical values of F-ratios in all MANOVA's.

## Results and Interpretation

Correlations among criterion/dependent variables regarding attitudes and satisfaction with instructional methods revealed significant correlation coefficients ranging from .13 to .67. Only attitude toward mass lectures failed to correlate significantly with attitudes regarding in-class oral exercises, in-class discussion, and in-class simulations. Most correlations fell in the moderate range of .20-.45. The correlation coefficient between the two criterion/dependent variables measuring achievement (exam average, project average) was also significant ($r = .49$). Assumptions regarding the relatedness of dependent variables in MANOVA were met.

### Oral Communication Apprehension and Attitudes/Satisfaction

The MANOVA of attitudes/satisfaction regarding instructional strategies revealed a significant difference ($F = 25.75$, 1/70 d.f., $p < .05$) between high and low oral communication apprehensives. The mean of the canonical variable representing attitudes/satisfaction was significantly lower for high apprehensives ($\bar{X} = .25$, $n = 46$) than for low apprehensives ($\bar{X} = .40$, $n = 26$, see table 1 for raw means). The 24% classified as high apprehensives (46 of 194) were well above norms (16%, McCroskey, 1970), indicating that subject attrition in data collection was not a function of oral communication apprehension. The correlation coefficients between the canonical variable and the separate attitude/satisfaction scores were examined. Satisfaction with oral assignments ($r = .64$) and attitude towards in-class discussions ($r = .57$) were the dominant contributors to the canonical variable reflecting attitudes/satisfaction regarding instructional strategies (see table 2 for correlations of other associated variables). These results were consistent with the univariate analyses indicating significant differences only on satisfaction with oral assignments and attitude toward in-class discussions. Taken together, these results support the first hypothesis which predicted that high oral communication apprehensives would exhibit significantly less favorable attitudes and express significantly less satisfaction with instructional satisfaction with instructional strategies requiring oral communication.

### Receiver Apprehension and Attitudes/Satisfaction

The MANOVA of attitudes/satisfaction regarding instructional strategies revealed a significant difference ($F = 35.69$, 1/54 d.f., $p < .05$) between high and low receiver apprehensives. The mean of the canonical variable representing attitudes/satisfaction was significantly lower for high receiver apprehensives ($\bar{X} = .42$, $n = 23$) than for low receiver apprehensives ($\bar{X} = .71$, $n = 33$, see table 1 for raw means). The 12% classified as high receiver apprehensives (23 of 194) were consistent with expected norms (12%, Wheeless, 1975), indicating again that attrition in data collection was not a function of receiver apprehension. The correlation coefficients between the canonical variable and the separate attitude/satisfaction scores were examined. Attitudes toward in-class discussions ($r = .42$) and lectures in the small sections ($r = .35$) as well as satisfaction with oral assignments ($r = .33$) were the dominant contributors to the canonical variable relecting attitudes/satisfaction regarding instructional strategies (see table 2 for correlations of other associated variables). These results were consistent with the univariate analyses indicating significant differences only on attitudes

toward in-class discussion (2-tailed) and lectures in the small sections and satisfaction with oral assignemtns (2-tailed).

These results, as they related to instructional strategies regarding reception and interpretation of communication, provide only weak support, at best, for the hypothesis. Attitudes toward receiving mass lectures, reading the text, and other instructional strategies that were expected to be related to receiver apprehension were neither significantly different nor meaningfully related to the canonical variable reflecting attitudes/satisfaction. Only reception of lab section lectures was related. On the other hand, satisfaction with oral assignments and attitude toward in-class discussions were associated with levels of receiver apprehension. This association was explained by careful examination of the data. A substantial portion of high receiver apprehensives were all high in oral communication apprehension which appeared, in turn, to have overriding impact on attitudes/satisfaction regarding the various instructional strategies.

Writing Apprehension and Attitudes/Satisfaction

The MANOVA of attitudes/satisfaction regarding instructional strategies revealed a significant difference ($F = 27.02$, 1/65 d.d., $p < .05$) between high and low writing apprehensives. The mean of the canonical variable representing attitudes/satisfaction was significantly lower for high writing apprehensives ($\bar{X} = .36$, $n = 36$) than for low writing apprehensives ($\bar{X} = .51$, $n = 31$; see table 1 for raw means). The 19% classified as high apprehensives (36 of 194) were slightly above norms expected, indicating that subject attrition was not a function of writing apprehension. The correlation coefficients between the canonical variable and the separate attitude/satisfaction scores were examined. Satisfaction with written assignments ($r = .66$) as well as attitudes toward out-of-class projects which require writing ($r = .41$) and in-class discussions ($r = .42$) were dominant contributors to the canonical variable reflecting attitudes/satisfaction regarding instructional strategies (see table 2 for correlations of other associated variables). These results were consistent with the univariate analyses indicating significant differences only on satisfaction with written assignments, attitudes toward out-of-class porjects which require writing, and attitudes toward in-class discussions (2-tailed). These results support the third hypothesis. The difference in attitude toward in-class discussions, which appears to be attributable to differences in writing apprehension, is more realistically attributable to the substantial number of high oral communication apprehensives who were also high in writing apprehension.

Additive Effects on Attitude/Satisfaction and Achievement

The fourth and fifth hypotheses predicting additive effects of oral, writing, and receiver apprehension on attitudes, satisfaction, and achievement were impossible to test. The three-way MANOVA (High-Low PRCA X High-Low RAT X High-Low WAT) was able to classify a total of only 16 Ss into the relevant cell conditions. Two conditions had no subjects and 3 conditions had only one subject each. Only 8% of the subjects (16 of 194) were high and/or low across the three types of apprehension (8 cells). Rather, 92% were moderate in apprehension on at least one of the three measures which effectively prevented classification needed to test additivity. (Note that a 3-way analysis including moderate levels would not solve this problem since the 8-cells common to both analyses would still contain insufficient n.)

These observations, however, point to a meaningful interpretation. The relatively few persons displaying categorical combinations of the three types of high and low apprehension minimize the importance of examining additive effects.

Rather, because so few people fit the categorical combinations (8%), the conclusion that must be drawn favors the alternative hypothesis: For most people (approximately 92%) oral, writing, and receiver apprehension are probably not additive.

Likewise, the research questions, seeking to determine the best instructional strategies for various categorical combinations of the three types of apprehension, appear to be of minimum importance. Rather, high levels of apprehension on any of the three types of apprehension point to in-class discussion as a poor instructional strategy in terms of attitudes/satisfaction. Students high in oral or receiver apprehension were also less satisfied with oral assignments. Those high in receiver apprehension were less favorable toward lectures and those high in writing apprehension expressed lower attitudes/satisfaction for writing in and out of class.

## Conclusions

Clinical methodologies like reality therapy[18] and systematic desensitization[19] are often beyond the training or available resources of a good many speech communication teachers. In recognition of this fact communication theorists have attempted to determine if there are any alternative methodologies that teachers might be able to more readily use in their efforts to overcome the problem of high communication apprehension.

In this study, it was reasoned that students who are highly apprehensive about communication are likely to view specific instructional practices more favorably than others, depending upon the type of communication apprehension experienced. It was also reasoned that if this was, in fact, the case, specific instructional strategies to teach the highly apprehensive student could be developed.

The findings of this investigation, however, suggest that the preceding kind of adaptation is probably not a viable means for coping with the instructional needs of students who are highly apprehensive about communication. Treatment of the apprehension itself, consequently, still appears to be the most direct and effective instructional strategy open to speech communication teachers.

In closing, we need to emphasize the fact that the interpersonal communication course investigated in this study conformed to a traditional instructional model (i.e., lecture, readings, oral, and written performance). Thus, whether the preceding conclusion would hold for alternative instructional models such as PSI remains an empirical question.

## Footnotes

[1]J. C. McCroskey, "Measures of Communication Bound Anxiety," Speech Monographs, 37(1970), 269-277.

[2]McCroskey, "Measures of Communication Bound Anxiety," 269-277.

[3]L. R. Wheeless, "An Investigation of Receiver Apprehension and Social Context Dimensions of Communication Apprehension," A paper presented at the annual convention of the International Communication Association, New Orleans, 1974.

[4]J. Daly and M. Miller, "The Development of a Measure of Writing Apprehension," Paper presented at the Annual Convention of the International Communication Association, Chicago, April, 1975.

[5]McCroskey, "Measures of Communication Bound Anxiety," 269-277.

[6]McCroskey, "Measures of Communication Bound Anxiety," 269-277.

[7]J. C. McCroskey, "The Classroom Effects of Communication Apprehension," A paper presented to the Annual Convention of the Speech Communication Association, Houston, 1975.

[8]Wheeless, "An Investigation of Receiver Apprehension and Social Context Dimensions of Communication Apprehension."

[9]L. R. Wheeless and M. D. Scott, "The Nature, Measurement, and Potential Effects of Receiver Apprehension," A paper presented to the Annual Convention of the International Communication Association, Portland, 1976.

[10]J. Daly and M. Miller, "Further Studies on Writing Apprehension: SAT Scores, Success Expectations, Willingness to Take Advanced Courses and Sex Differences," Research in Teaching English (in press).

[11]Daly and Miller, "Further Studies on Writing Apprehension: SAT Scores, Success Expectations, Willingness to Take Advanced Courses and Sex Differences," Research in Teaching English (in press).

[12]M. Scott, M. Yates, and L. Wheeless, "An Exploratory Investigation of the Effects of Communication Apprehension in Alternative Systems of Instruction," Paper presented at the Annual Convention of the International Communication Association, Chicago, April, 1975.

[13]McCroskey, "Measures of Communication Bound Anxiety," 269-277.

[14]Wheeless, "An Investigation of Receiver Apprehension and Social Context Dimensions of Communication Apprehension."

[15]Daly and Miller, "The Development of a Measure of Writing Apprehension."

[16]C. Osgook, G. Suci and D. Tannenbaum, The Measurement of Meaning (Urbana: University of Illinois Press, 1957).

[17]J. C. Nunnally, Psychometric Theory (New York: McGraw-Hill, 1967), pp. 193-194.

[18]G. M. Phillips, "Reticence: Pathology of the Normal Speaker," Speech Monographs, 35(1968), 39.

[19]J. C. McCroskey, "The Implementation of a Large Scale Program of Systematic Desensitization for Communication Apprehension. Speech Teacher, 21(1972), 255-264.

Table 1
Raw Means of Attitude/Satisfaction Variables

| Dependent Variable | PRCA Low | PRCA High | PAT Low | PAT High | WAT Low | WAT High |
|---|---|---|---|---|---|---|
| Mass Lecture Attitude | 13.58 | 14.72 | 15.64 | 15.00 | 13.97 | 15.75 |
| Lab Lecture Attitude | 22.96 | 21.70 | 23.94* | 21.48* | 23.00 | 19.25 |
| Attitude toward In-class Oral Exercises | 21.19 | 19.39 | 22.09 | 20.78 | 21.94 | 19.67 |
| Attitude toward In-class Writing | 20.00 | 18.33 | 20.55 | 19.74 | 19.58 | 18.67 |
| Reading Text Attitude | 16.85 | 14.72 | 17.61 | 16.65 | 18.00 | 16.06 |
| In-class Discussion Attitude | 22.65* | 19.89 | 22.76* | 19.91* | 22.58* | 20.28* |
| In-class Simulation Attitude | 22.58 | 21.24 | 23.30 | 21.39 | 22.97 | 20.94 |
| Out-of-class Observations Attitude | 20.73 | 18.98 | 19.70 | 21.52 | 20.61 | 19.03 |
| Out-of-class Observations and Writing Attitude | 20.46 | 19.28 | 20.42 | 19.52 | 21.19* | 18.50* |
| Satisfaction with Oral Assignments | 18.58* | 14.15* | 18.36* | 15.43* | 18.06 | 16.75 |
| Satisfaction with Reception Assignments | 19.77 | 19.74 | 20.64 | 19.26 | 21.52 | 19.25 |
| Satisfaction with Writing Assignments | 18.54 | 17.20 | 19.08 | 18.78 | 20.48* | 16.00 |

*significantly different, $p < .05$. Hypothesized differences one-tailed; non-hypothesized differences two-tailed.

Table 2
Correlation Coefficients of Dependent Variables with the Canonical Variable

| Dependent Variables | Canonical Variables For High and Low PPCA Analysis | High and Low RAT Analysis | High and Low WAT Analysis |
|---|---|---|---|
| Mass Lecture Attitude | -.17 | .06 | -.24 |
| Lab Lecture Attitude | .22 | .35 | .13 |
| Attitude toward In-class Oral Exercises | .28 | .18 | .37 |
| Attitude toward In-class Writing | .24 | .10 | .13 |
| Reading Text Attitude | .33 | .11 | .29 |
| In-class Discussion Attitude | .57 | .42 | .42 |
| In-class Simulation Attitude | .22 | .29 | .34 |
| Out-of-class Observations Attitude | .29 | -.19 | .22 |
| Out-of-class Observations and Writing Attitude | .20 | .10 | .41 |
| Satisfaction with Oral Assignments | .64 | .33 | .19 |
| Satisfaction with Reception Assignments | .00 | .15 | .20 |
| Satisfaction with Writing Assignments | .18 | .12 | .66 |